

WHAT IS CLAIMED IS:

Sub A1

1. A method of driving a liquid crystal display device,
said liquid crystal display device comprising:
 - a first insulating substrate;
 - a second insulating substrate being disposed opposite to the first insulating substrate;
 - a first electrode being formed over the first insulating substrate;
 - a second electrode being formed over the first insulating substrate;
 - a liquid crystal material being interposed between the first and second insulating substrates;said method comprising the steps of:
 - producing a parallel electric field to the first insulating substrates, said parallel electric field being generated between the first and second electrodes, and
 - driving the liquid crystal material by the parallel electric field.
2. A method according to claim 1, wherein the liquid crystal display device is a reflective type liquid crystal display device,
said reflective type liquid crystal display device comprising:
 - the first insulating substrate having transparency;
 - a reflecting layer;
 - at least a part of said second insulating substrate covering the reflecting layer;

a first conducting line for applying electrical signals to the first electrode, said first conducting line being formed over the first insulating substrate;

a first thin film transistor formed over the first insulating substrate as a switching element and electrically connected to the first electrode and the first conducting line,

said first thin film transistor comprising:

a crystalline semiconductor island formed over the first insulating substrate;

source and drain regions formed in the crystalline semiconductor island;

a gate electrode formed adjacent to the crystalline semiconductor island having a gate insulating film therebetween,

a pair of low concentration regions each being adjacent to the source and drain regions in the crystalline semiconductor island;

an interlayer insulating film covering the first thin film transistor, said interlayer insulating film being a multilayer film of silicon oxide and silicon nitride;

the second electrode being electrically insulated from the first electrode and from the first conducting line; and

a second conducting line for applying electrical signals to the second electrode, said second conducting line being formed on the first insulating substrate,

wherein the liquid crystal material is operated by a parallel electric field to the first substrate, said parallel electric field being generated between the first and second electrodes,

wherein the liquid crystal material is oriented in a hybrid alignment nematic mode.

000001 8329350

3. A method according to claim 1,
wherein each of the first and second electrodes has transparency.

4. A method according to claim 1,
wherein the first and second electrodes are alternately protruding
lines of electrodes which are nested in each other alternately with a given
spacing therebetween.

5. A method according to claim 1,
wherein each of the first and second electrodes comprises ITO.

6. A device according to claim 1,
wherein each of first and second insulating substrate is one selected
from the group consisting of glass, quartz and polyethylene sulfate.

Sub A2 → 7. A method of driving a liquid crystal display device,
said liquid crystal display device comprising:
a first insulating substrate;
a second insulating substrate being disposed opposite to the
first insulating substrate;
a first electrode being formed over the first insulating
substrate;
a first thin film transistor being formed over the first
insulating substrate as a switching element;
a second thin film transistor formed over the first insulating
substrate for driving the first thin film transistor;

a second electrode being formed over the first insulating substrate;

a liquid crystal material being interposed between the first and second insulating substrates;

said method comprising the steps of:

producing a parallel electric field to the first insulating substrates, said parallel electric field being generated between the first and second electrodes, and

driving the liquid crystal material by the parallel electric field.

8. A method according to claim 7, wherein the liquid crystal display device is a reflective type liquid crystal display device,

said reflective type liquid crystal display device comprising:

the first insulating substrate having transparency;

a reflecting layer;

at least a part of said second insulating substrate covering the reflecting layer;

a first conducting line for applying electrical signals to the first electrode, said first conducting line being formed over the first insulating substrate;

the first thin film transistor being electrically connected to the first electrode and the first conducting line;

said first thin film transistor comprising:

a crystalline semiconductor island formed over the first insulating substrate;

source and drain regions formed in the crystalline semiconductor island;

a gate electrode formed adjacent to the crystalline semiconductor island having a gate insulating film therebetween,

a pair of low concentration regions each being adjacent to the source and drain regions in the crystalline semiconductor island;

an interlayer insulating film covering each of the first and second thin film transistors, said interlayer insulating film being a multilayer film of silicon oxide and silicon nitride;

a second electrode formed over the first insulating substrate and electrically insulated from the first electrode and from the first conducting line;

a second conducting line for applying electrical signals to the second electrode, said second conducting line being formed over the first insulating substrate;

a biaxial film disposed over the first insulating substrate; and

a polarizing plate disposed on the biaxial film,

wherein the liquid crystal material is operated by a parallel electric field to the first substrate, said parallel electric field being generated between the first and second electrodes,

wherein the liquid crystal material is oriented in a hybrid alignment nematic mode.

9. A method according to claim 7,
wherein each of the first and second electrodes has transparency.
10. A method according to claim 7,
wherein the first and second electrodes are alternately protruding lines of electrodes which are nested in each other alternately with a given spacing therebetween.

66044-66046

11. A method according to claim 7,
wherein each of the first and second electrodes comprises ITO.
12. A method according to claim 7,
wherein each of first and second insulating substrate is one selected
from the group consisting of glass, quartz and polyethylene sulfate.
13. A method of driving a liquid crystal display device,
said liquid crystal display device comprising:
 - a first insulating substrate;
 - a second insulating substrate being disposed opposite to the
first insulating substrate;
 - a first electrode being formed over the first insulating
substrate;
 - a first thin film transistor being formed over the first
insulating substrate as a switching element;
 - a second thin film transistor being formed over the first
insulating substrate for driving the first thin film transistor;
 - an interlayer insulating film covering each of the first and
second thin film transistors;
 - a second electrode being formed over the first insulating
substrate;
 - a liquid crystal material being interposed between the first
and second insulating substrates;said method comprising the steps of:
 - producing a parallel electric field to the first insulating
substrates, said parallel electric field being generated between the first and
second electrodes, and

driving the liquid crystal material by the parallel electric field.

14. A method according to claim 13, wherein the liquid crystal display device is a reflective type liquid crystal display device,
- said reflective type liquid crystal display device comprising:
 - the first insulating substrate having transparency;
 - the second insulating substrate having a reflecting layer thereon;
 - a first conducting line for applying electrical signals to the first electrode, said first conducting line being formed over the first insulating substrate;
 - the first thin film transistor being electrically connected to the first electrode and the first conducting line;
 - said first thin film transistor comprising:
 - a crystalline semiconductor island formed over the first insulating substrate;
 - source and drain regions formed in the crystalline semiconductor island;
 - a gate electrode formed adjacent to the crystalline semiconductor island having a gate insulating film therebetween,
 - a pair of low concentration regions each being adjacent to the source and drain regions in the crystalline semiconductor island;
 - the second thin film transistor including an n-channel third thin film transistor and a p-channel fourth thin film transistor being connected to each other;
 - the interlayer insulating film being a multilayer film of silicon oxide and silicon nitride;

the second electrode being electrically insulated from the first electrode and from the first conducting line; and

a second conducting line for applying electrical signals to the second electrode, said second conducting line being formed over the first insulating substrate,

wherein the liquid crystal material is operated by a parallel electric field to the first substrate, said parallel electric field being generated between the first and second electrodes, and

wherein the liquid crystal material has a first orientation near the first insulating substrate while the liquid crystal material has a second orientation near the second insulating substrate, said second orientation being different from the first orientation.

15. A method according to claim 13,
wherein each of the first and second electrodes has transparency.

16. A method according to claim 13,
wherein the first and second electrodes are alternately protruding lines of electrodes which are nested in each other alternately with a given spacing therebetween.

17. A method according to claim 13, wherein each of the first and second electrodes comprises ITO.

18. A method according to claim 7, wherein each of the first and second insulating substrate is one selected from the group consisting of glass, quartz and polyethylene sulfate.

Sub
C1

Sub 24

19. A method of driving a reflective type liquid crystal display device, said reflective type liquid crystal display device comprising:

- a first insulating substrate;
- a second insulating substrate being disposed opposite to the first insulating substrate;
- a reflecting layer on the second insulating substrate;
- a first electrode being formed over the first insulating substrate;
- a second electrode being formed over the first insulating substrate;
- a liquid crystal material being interposed between the first and second insulating substrates;

said method comprising the steps of:

- producing a parallel electric field to the first insulating substrates, said parallel electric field being generated between the first and second electrodes, and
- driving the liquid crystal material by the parallel electric field.

20. A method according to claim 19, said reflective type liquid crystal display device further comprising:

- the first insulating substrate having transparency;
- a first conducting line for applying electrical signals to the first electrode, said first conducting line being formed over the first insulating substrate;
- a first thin film transistor formed over the first insulating substrate as a switching element and electrically connected to the first electrode and the first conducting line;

21. A method according to claim 19,
wherein each of the first and second electrodes has transparency.

22. A method according to claim 19,
wherein the first and second electrodes are alternately protruding
lines of electrodes which are nested in each other alternately with a given
spacing therebetween.

23. A device according to claim 19,
wherein each of the first and second electrodes comprises ITO.

24. A device according to claim 19,
wherein each of the first and second insulating substrate is one
selected from the group consisting of glass, quartz and polyethylene sulfate.